Sai Krishna Deepak Maram

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Research Interests

Computer Security, Applied Cryptography

Education

2018 - present **Ph.D. in Computer Science**.
Cornell University, USA
Advisor: *Ari Juels*

2012 - 16 **B.Tech in Computer Science with Honors**.
Indian Institute of Technology, Bombay, India
GPA: 8.91/10

Publications

[1] **DECO: Liberating Web Data Using Decentralized Oracles**.
F. Zhang, **S.K.D. Maram**, H. Malvai, S. Goldfeder, and A. Juels. At Real World Crypto (RWC) 2020.

[2] **CHURP: Dynamic-committee Proactive Secret Sharing**.
S.K.D. Maram, F. Zhang, L. Wang, A. Low, Y. Zhang, A. Juels, and D. Song. Proceedings of the 2019 ACM Conference on Computer and Communications Security (CCS).

[3] **SkinnerDB: Regret-Bounded Query Evaluation via Reinforcement Learning**.
I. Trummer, S. Moseley, **S.K.D Maram**, S. Jo, and A. Antonakakis. Proceedings of the 2019 International Conference on Management of Data (SIGMOD).

[4] **Incentive Stackelberg Mean-payoff Games**.
A. Gupta, S. Schewe, A. Trivedi, **S.K.D. Maram**, P. Bharath Kumar. Proceedings of the 2016 Conference on Software Engineering and Formal Methods (SEFM).

Honors / Awards

2018 Awarded University Fellowship by Cornell University

2012 Secured All India Rank 12 in *IIT-JEE* out of 500,000 students

2012 Secured All India Rank 36 in *AIEEE* out of 1,100,000 students

2012 Recipient of KVPY scholarship and attended VIJYOSHI Camp

2011 Awarded merit certificate for being in top 1% in National Standard Examination - Astronomy

Posters / Talks

2019 **CHURP: Dynamic-committee Proactive Secret Sharing**.
Presented our work at the ACM conference on Computer and Communication Security (CCS), London.
Gave a talk at the Initiative for Cryptocurrencies and Contracts (IC3) Winter Retreat, Interlaken.

2018 **SkinnerDB: Regret-Bounded Query Evaluation via Reinforcement Learning**.
Presented a poster at the Conference on Very Large Data Bases (VLDB) 2018, Rio.

2015 **DoS attacks on SCION and SCION Discrete Event Simulator**.
Gave a talk at the end of my research internship at ETH Zurich.

2015 **Efficient Traffic-analysis Resistant Anonymity Networks**, *IIT Bombay*.

2014 **Algorithms for solving Parity Games**, *IIT Bombay*.

Projects

2019 **DECO: Liberating Web Data Using Decentralized Oracles**, *Cornell*.
Designed a novel privacy-preserving oracle protocol that makes public and private data accessible to a rich spectrum of applications including smart contracts. DECO works with modern TLS versions and relies on optimized MPC and zero-knowledge techniques. Implemented the a zero-knowledge parser in xjsnark to prove arbitrary statements about underlying TLS-protected data.

2019 **CHURP: Dynamic-committee Proactive Secret Sharing**, *Cornell*.
Devised a novel cryptographic protocol to facilitate dynamic committees in secret sharing, thus enabling a decentralized key management system. Improved the state-of-the-art protocol to incur atleast 1000x less communication cost for large committees.

2018 **Howl: Decentralized Anonymity Networks using DC-Nets and Trusted Hardware**, *Cornell*.
Designed a DoS-resistant anonymity network through the novel combination of DC-Nets and trusted execution environments (TEEs). Howl leverages a new aggregation protocol to achieve high bandwidth DC-Nets and uses TEEs to prevent DoS. Implemented in Rust using Baidu SGX SDK.

2018 **SkinnerDB: Regret-Bounded Query Evaluation via Reinforcement Learning**, *Cornell*.
Expanded the query processing engine of a novel learning-based DBMS (SkinnerDB) by supporting multiple new query types. Involved understanding and implementing query optimization strategies in Java. Demonstrated orders of magnitude improvement over a traditional DBMS for some difficult-to-optimize queries.

2015 **SCION: Next generation Internet Architecture**, *ETH Zurich*.
Research Internship, *Guide: Prof.Adrian Perrig*
Devised a new category of DoS attack on a new internet architecture (SCION) that exploit the network architecture to gain extended access to favorable routing paths. Also proposed defenses that render such an attack impractical. In another related project, built a discrete event simulator and topology generator for SCION in Python in order to perform large-scale network simulations.

2015 **Bit-rate adaptation in wireless networks**, *IIT Bombay*.
R&D Project, *Guide: Mythili Vutkuru*
Experimented with lookaround rate of a popular wireless bit-rate adaptation algorithm (Minstrel) using a network simulator, ns3. Formulated bit-rate adaptation as an instance of the Multi-armed bandit problem.

2015 **Building a compiler from scratch**, *IIT Bombay*.
Course Project, *Guide: Prof. Amitabha Sanyal*
Developed a lexical analyzer using flex and a parser using bison, as part of implementing a compiler for a C-style language. Using Sethi-Ullman algorithm, we performed register allocation efficiently.

2014 **Incentive stackelberg mean-payoff games**, *IIT Bombay*.
R&D Project, *Guide: Ashutosh Trivedi*
Implemented a tool in C++ to solve multi-player mean-payoff games (MMPG) using various equilibria. Demonstrated that incentive equilibria strategies perform significantly better than other equilibria.

2013 **Tetris**, *IIT Bombay*.
Class Project, *Guide: Prof. Amitabha Sanyal*
Designed a Tetris player using a functional programming language, Scheme. Employed minimax algorithm to guess the best possible move for the player at any stage.

Industry Experience

July 2016–Dec 2017 **Software Developer**, *Oracle*, Bangalore.
Back-end Java Developer for the GlassFish application server. Implemented several core features, bug fixes in the deployment module that released in Java EE RI 8. Handled the external transfer of several important artifacts of GlassFish project such as Github issues, bug reports using Bash and NodeJS scripting.

May-July 2014 **Developer Internship**, *Housing.com*, Mumbai.
Trained a regression model to optimize the bids placed on ads displayed in Google Search Engine based on factors such as the number of clicks, cost, and impressions. Implemented using Google AdWords Python API.

Teaching Experience

2016 **Teaching Assistant**, *IIT Bombay*, CS101: Computer Programming.

2015 **Undergraduate Tutor**, *IIT Bombay*, Data Structures and Algorithms.

Graduate Course Work

Advanced Programming Languages, Advanced Operating Systems, Intro to Computer Vision, Security & Privacy Technologies, Cryptocurrency and Smart Contracts, Advances in Intelligent and Learning Agents (UG), Advanced Cryptography (UG), Computational Ring Theory (UG), Graph Theory (UG)

Technical Skills

Languages C++ (4000 lines), Python (3000 lines), Java (3000 lines), Rust (500 lines)

Service / Extra-curriculars

2019 Serving as the treasurer of PhD student organization At Cornell Tech (PACT)

2014 Awared first prize at the *XLR8* competition for designing a Wireless Controlled Bot

2003 - 07 Won first prize in several district-level chess competitions and participated in state-level competitions